

US EPA Mid-Continent Ecology Division

Research Project Summary

Nutrient Response in Great Lakes Coastal Wetlands

Overview

The EPA's National Health and Environmental Effects Research Laboratory (NHEERL) has initiated a research program to develop a scientifically sound approach for establishing nutrient criteria for US coastal ecosystems. Quantitative relationships between nutrient loading and biological responses provide a strong foundation for development of nutrient criteria, and determining these relationships is the goal of the NHEERL research. In support of this goal, this Division is studying relationships between nutrient loading and responses of food webs, aquatic plant communities, and physical habitat characteristic in coastal wetlands of the Great Lakes. The Division's nutrient research is closely integrated with its research on relationships between habitat characteristics and fish populations of coastal wetlands and is in collaboration with the EPA-funded Great Lakes Environmental Indicators (GLEI) project (see link).

Our experimental approach is to measure key aspects of the nutrient regime and biota in a set of coastal wetlands that spans relevant gradients in anthropogenic stressors and natural conditions in the Great Lakes basin. Our sampling is focused on quantifying primary producers (planktonic and attached algae, emergent and submergent plants) and flow of energy through food webs as measured by stable isotope analysis of key components of wetland foodwebs (primary producers, invertebrate, and fish consumers). In order to assess the influence of natural factors and reduce the variability in loading-response relationships, we stratified our sampling by wetland hydrology/morphology (riverine systems with significant inflow of water vs. protected wetlands that had little or no stream or river inflow) and biogeography (upper vs. lower Lakes). In the summers of 2002 and 2003 we sampled 44 wetlands distributed across all five Great Lakes. Preliminary analysis of data collected in 2002 indicates that we were successful in capturing a broad nutrient gradient in our sampling and suggests that strong relationships exist between landscape-scale measures of nutrient loading and planktonic algae biomass.

Key Products

Thompson JA and Morrice JA. Resolving algal responses to nutrient enrichment in Great Lakes Coastal Wetlands.

Latimer J, Dettmann E, Sierszen ME, and Morrice JA. Identification of residence time or other factors that may be used to classify Southern New England estuaries and Great Lake systems for their response to nutrient loading.

Sierszen ME and Thompson JA. Report on coastal wetlands of the Great Lakes: Discrimination of trends in food web response as a function of nutrient loading and ecosystem classification factors.

Sierszen ME, Morrice JA, and Thompson JA. Report on the Great Lake coastal wetlands: Defining food web nutrient response thresholds.

<http://glei.nrri.umn.edu>

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